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EXAMINER

ZETTL, MARY E

ART UNIT

PAPER NUMBER

2878

DATE MAILED: 09/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/734,727

Applicant(s)

GRAU ET AL.

Examiner

Mary Zettl

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on April 5, 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>April 5, 2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

The length of the abstract should be increased.

Claim Objections

2. Claim 12 is objected to because of the following informalities: the phrase "means allow to compare" in the second line of the claim is grammatically incorrect. Appropriate correction is required.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 16 recites the limitation "the detector" in the third line of the claim. There is insufficient antecedent basis for this limitation in the claim. Appropriate modification is suggested.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 14-18 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Plasek (US 5,459,314 A).

Regarding claims 14 and 21, Plasek discloses a method (Abstract) for evaluating a natural gamma-ray activity within a borehole the method comprising: determining an interval count rate (Figure 3, steps 21 and 22), the interval count rate corresponding to gamma-rays having an energy within a predetermined correction interval; calculating a correction count rate from the determined interval count rate (Fig. 3, step 26; col. 7, lines 8-10); and using the correction count rate to evaluate the natural gamma-ray activity (Fig. 3, step 27; col. 8, lines 1-4), and stabilizing a gain of the gamma ray detector (utilizing gain stabilization source; col. 5, line 63).

Regarding claim 15, Plasek discloses the limitations set forth in claim 14, and further discloses the method wherein the predetermined correction interval is semi infinite above a predetermined correction threshold (above 0.75 Mev; Figure 4; col. 6, lines 32-36).

Regarding claims 16 and 17, Plasek discloses the limitations set forth in claim 15 and further discloses the method comprising measuring a total gamma count rate

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gamma-rays detected by the detector; subtracting the correction count rate from the total gamma count rate to evaluate the natural gamma-ray activity (col. 8, lines 25-38); wherein the correction count rate is proportional to the determine interval count rate (partial count rate in selected energy windows; col. 8, lines 38-49).

Regarding claim 18, Plasek discloses all of the limitations set forth in claim 14, and further discloses a gamma-ray inducing source (col. 5, lines 50-53) located downhole in a neighborhood of the system; and the gamma-ray inducing source is an high energy neutron generator (col. 4, lines 36-37).

5. Claims 25 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Jones (US 3,767,921 A).

Regarding claims 25 and 28, Jones teaches a system for evaluating a natural gamma-ray activity within a borehole (col. 8, lines 25-30), the system comprising: a detector (Figure 1, item 10; col. 3, lines 58-59) located downhole to detect gamma-rays; at least one discriminator (Figure 1, item 13; col. 4, lines 56-61) to determine an interval count rate, the interval count rate corresponding to gamma-rays having an energy within a predetermined correction interval; processing means (data processing circuits; Figure 1, item 41) to calculate a correction count rate from the determined interval count rate, the correction count rate being used to evaluate the natural gamma-ray activity (col. 8, lines 31-44); and a gamma-ray inducing source being a high energy neutron generator located downhole near the system (col. 3, lines 62-68).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-4, 6-11, 26, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones (US 3,767,921 A) in view of Plasek (US 5,459,314 A).

Regarding claims 1-3 and 6-8, Jones teaches a method for stabilizing a gain of a gamma-ray detector for use in a downhole logging tool (col. 7, lines 61-64), wherein the detector is intended to detect natural gamma-rays from a formation surrounding a borehole (col. 2, lines 45-51) and a gamma ray inducing source (Figure 1, item 6; col. 3, lines 62-68) located in a neighborhood of a gamma-ray detector, wherein a detector is intended to detect high energy neutron induced gamma rays. The method further comprises: determining a first rate (counts per minute), the first rate corresponding to gamma-rays having an energy within a first predetermined energy interval (energy window); determining a second rate, the second rate corresponding to gamma-rays having an energy within a second predetermined energy interval (Figure 2; col. 8, lines 3-8). Jones mentions (col. 8, lines 4-6) that alternative energy regions may be used other than those shown in Figure 2, and further mentions a gain control system utilizing plot peaks (col. 5, lines 4-20). Jones also teaches adjusting the gain such that a ratio of the first rate and the second rate substantially equal a predetermined (calibrated) value

(col. 8, lines 36-39). Jones does not expressly disclose utilizing energy intervals straddling the backscatter peak in order to process the backscatter peak. Plasek teaches a method for measuring formation density corrected for activation gamma radiation (Abstract) in which the total density spectrum (Figure 4) is divided into energy intervals (windows), including energy intervals (Fig. 4, items 33 and 34) that straddle the backscatter peak. At the time the invention was made it would be obvious to a person of ordinary skill in the art to modify the gain stabilization method of Jones by utilizing energy intervals around the back scatter peak as suggested by Plasek since the backscatter peak is relatively independent of a density and an elemental composition of the drilling material. This stability of the backscatter peak, allows it to be utilized as a means for stabilizing the gain.

Regarding claim 4, Jones in view of Plasek teaches the limitations set forth in claim 2, however does not disclose expressly adjusting the gain such that a difference of the first rate and the second rate multiplied by a predetermined positive coefficient substantially equals zero. Plasek teaches dividing the count vs. energy graph into energy windows straddling the backscatter peak (Figure 4). At the time the invention was made, it would be obvious to a person of ordinary skill that the first rate (number of counts) on one side of a uniform backscatter peak should essentially be the same as the second rate on the corresponding mirror portion on the other side of the back scatter peak, thus since the difference between the two rates would be essentially zero, multiplying by a predetermined coefficient would also equal zero. It would be further

obvious to a person of ordinary skill in the art to utilize the above reasoning to ensure the uniformity of the backscatter peak and to aid in adjusting the gain.

Regarding claims 9-11, Jones in view of Plasek teaches the limitations as applied to claim 1. Jones further teaches a adjusting means to adjust the gain of the gamma-ray detector (col. 4, line 68 to col. 5, lines 1-6) and a calculating means (data processing circuitry; Figure 1, item 41) to calculate a ratio of the first rate and the second rate to compare the ratio to a predetermined value (col. 8, lines 36-39). Plasek further discloses discriminating means (Figure 1; item 13; col. 4, lines 56-60) allowing a comparison of the energy of the detected gamma-rays to multiple regulation thresholds (corresponding to the limits of the energy windows; Figure 3, step 25; col.7, lines 1-4) the multiple regulation thresholds being located in an energy neighborhood of a backscatter peak of a full gamma spectrum (Figure 4). Plasek teaches three of these thresholds setting up a first predetermined energy interval and a second predetermined interval which allows the determination of a first rate and a second rate corresponding to respective intervals. It would be obvious at the time the invention was made to one skilled in the art to modify the invention of Jones such that three regulation thresholds were located in the neighborhood of a backscatter peak in order to allow the gain of the backscatter peak to be adjusted.

Regarding claim 26, Jones discloses the limitations set forth in claim 25. Jones does not disclose expressly a system wherein the correction interval is semi infinite above a predetermined correction interval. Plasek teaches a correction interval that is semi infinite above a predetermined correction threshold (above 0.75 Mev; Figure 4; col.

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6, lines 32-36). At the time the invention was made, it would be obvious to one skilled in the art to modify the system of Jones such that correction intervals as suggested by Plasek were utilized in order to correct for activation overflows caused by non-density sources or by naturally occurring radioactivity and pile-up overflows caused by pile-up events.

Regarding claim 27, Jones in view of Plasek teaches the limitations set forth in claim 26: Jones further teaches a system wherein at least one discriminator is utilized to determine a first rate (counts per minute), the first rate corresponding to gamma-rays having an energy within a first predetermined energy interval (energy window) and determine a second rate, the second rate corresponding to gamma-rays having an energy within a second predetermined energy interval (Figure 2; col. 8, lines 3-8). Jones further teaches a calculating means (data processing circuitry; Figure 1, item 41) to calculate a ratio of the first rate and the second rate to compare the ratio to a predetermined value (col. 8, lines 36-39) and adjusting means to adjust a gain of the gamma-ray detector according to a result of the comparing (col. 7, lines 47-55).

7. Claims 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Plasek (US 5,459,314 A) in view of Jones (US 3,767,921 A).

Regarding claims 22 and 23, Plasek disclose the limitations set forth in claim 21. Plasek further discloses energy intervals that straddle a backscatter peak (Fig. 4, items 33 and 34). Plasek does not disclose expressly a method of adjusting the gain such that a ratio of a first rate and a second rate substantially equals a predetermined value.

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Jones teaches a method comprising: determining a first rate (counts per minute), the first rate corresponding to gamma-rays having an energy within a first predetermined energy interval (energy window); determining a second rate, the second rate corresponding to gamma-rays having an energy within a second predetermined energy interval (Figure 2; col. 8, lines 3-8). Jones mentions (col. 8, lines 4-6) that alternative energy regions may be used other than those shown in Figure 2, and further mentions a gain control system utilizing plot peaks (col. 5, lines 4-20). Jones also teaches adjusting the gain such that a ratio of the first rate and the second rate substantially equal a predetermined (calibrated) value (col. 8, lines 36-39). At the time the method was invented it would have been obvious to one of ordinary skill to modify the method of Plasek such that a value of the ratio of the first rate and the second rate equals a predetermined value in order to provide a means for adjusting the gain.

Regarding claim 24, Plasek discloses all of the limitations set forth in claim 21. Plasek does not disclose expressly generating calibration gamma-rays, the energy of the calibration gamma-rays being substantially equal to a well defined energy value; using the calibration gamma-rays to stabilize the gain of the gamma-ray detector. Jones discloses utilizing an initial calibration by the gain control circuitry to develop an error signal proportional to the difference from a predetermined constant ratio of the counts occurring in two energy regions (col. 3, lines 11-15). At the time the invention was made it would be obvious to one of ordinary skill in the art, to modify the method of Plasek by utilizing calibration as suggested by Jones in order to provide a means of

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determining necessary compensation for the detector supply voltage or to control the surface amplification of the signals.

8. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Plasek (US 5,459,314 A) and further in view of Minette (US 5,397,893 A).

Regarding claims 19 and 20, Plasek teaches the limitations set forth in claim 18 and further teaches that the neutron-induced gamma rays are due to an activation of oxygen atoms located in the drilling mud (col. 4, lines 38-39). Plasek does not disclose expressly a method wherein the evaluating of the natural gamma-ray activity is performed during a drilling of the borehole. Minette teaches a method for analyzing natural-gamma ray activity (col. 26, lines 64-66) from a measurement-while-drilling (MWD) formation (Abstract) in which a logging tool provides a means for tracking and compensating gain changes (col. 18, lines 3-15). Minette also teaches a method for setting up energy windows (col. 18, lines 49-62). At the time the invention was made it would be obvious to one skilled in the art to modify the invention of Plasek such that data could be analyzed while drilling in order to provide information about the formation of a surrounding drilled portion of the borehole in real time, preventing a loss in drilling time.

9. Claims 5, 12, 13, 29, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones (US 3,767,921 A) in view of Plasek (US 5,459,314 A) and further in view of Minette (US 5,397,893 A).

Regarding claim 5, Jones in view of Plasek discloses the limitations set forth in claim 1. Jones in view of Plasek does not disclose expressly, adjusting the gain such that a measured centroid position equals a reference centroid position. Minette teaches a gamma spectrum (Figure 30) with a Cesium monitor peak that allows tracking of gain changes and thus compensation for gain changes (col. 18, lines 3-15) through use of an energy calibration spectrum (Figure 31; col 18 line 37-38). At the time the invention was made, it would be obvious to a person of ordinary skill in the art to modify the method taught by Jones in view of Plasek by adjusting the gain such that the measured centroid position equals a reference centroid position as taught by Minette in order to improve the accuracy of the results.

Regarding claim 12, Jones in view of Plasek discloses the limitations set forth in claim 9. Plasek additionally discloses a discriminating means (Figure 1; item 13; col. 4, lines 56-60) for comparing the energy of the detected gamma-rays to a relatively high number of regulation thresholds (corresponding to the limits of the energy windows; Figure 3, step 25; col.7, lines 1-4) so as to obtain a complete spectrum (Figure 4). Jones in view of Plasek does not disclose expressly, adjusting the gain such that a measured centroid position equals a reference centroid position. Minette teaches a gamma spectrum (Figure 30) with a Cesium monitor peak that allows tracking of gain changes and thus compensation for gain changes (col. 18, lines 3-15) through use of an energy calibration spectrum (Figure 31; col 18 line 37-38). At the time the invention was made, it would be obvious to a person of ordinary skill in the art to modify the method taught by Jones in view of Plasek by adjusting the gain such that the measured centroid

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position equals a reference centroid position as taught by Minette in order to improve the accuracy of the results.

Regarding claim 13, Jones in view of Plasek discloses the limitations set forth in claim 9. Jones in view of Plasek does not disclose expressly a gamma-ray detector located in a drilling tool intended to detect natural gamma-rays. Minette teaches a method for analyzing natural-gamma ray activity (col. 26, lines 64-66) from a measurement-while-drilling (MWD) formation (Abstract) in which a logging tool provides a means for tracking and compensating gain changes (col. 18, lines 3-15). Minette also teaches a method for setting up energy windows (col. 18, lines 49-62). At the time the invention was made it would be obvious to one skilled in the art to modify the invention of Plasek such that data could be analyzed while drilling in order to provide information about the formation of a surrounding drilled portion of the borehole in real time, preventing a loss in drilling time.

Regarding claim 29 and 30, Jones discloses the limitations set forth in claim 28. Jones does not disclose expressly neutron-induced gamma-rays being due to an activation of oxygen atoms or a system wherein the detector is located in the drilling tool. Plasek teaches that the neutron-induced gamma rays are due to an activation of oxygen atoms located in the drilling mud (col. 4, lines 38-39). Minette teaches a method for analyzing natural-gamma ray activity (col. 26, lines 64-66) from a measurement-while-drilling (MWD) formation (Abstract) in which a logging tool provides a means for tracking and compensating gain changes (col. 18, lines 3-15). Minette also teaches a method for setting up energy windows (col. 18, lines 49-62). At the time

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the invention was made it would be obvious to one skilled in the art to modify the invention of Jones such that the neutron-induced gamma-rays are due to an activation of oxygen atoms as suggested by Plasek, since it is well known to one skilled in the art that oxygen has significant activation cross-section as well as a relatively long-lived activated state. It would be further obvious to one skilled in the art to modify the system of Jones in view of Plasek such that the detector was located in a drilling tool, so that data could be analyzed while drilling in order to provide information about the formation of a surrounding drilled portion of the borehole in real time and so that a loss in drilling time is prevented.

10. Claims 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones (US 3,767,921 A) in view of Jones et al. (US 6,666,285 B2).

Regarding claims 31 and 32, Jones (US 3,767,921 A) discloses the limitations set forth in claim 25. Jones (US 3,767,921 A) does not disclose expressly a system further comprising a shield located at the rear side of the crystal or a collar surrounding the crystal. Jones et al. (US 6,666,285 B2) teach a shield (Figure 3, item 37; col. 7, line 42) located at the rear side of a crystal of the gamma ray detector and a collar (Figure 3, item 12; col. 6, line 24) surrounding the crystal having a recess on the front side. At the time the invention was made it would be obvious to one of ordinary skill in the art to modify the system as suggested by Jones (US 3,767,921 A) by incorporating a shield and a collar as suggested by Jones et al. (US 6,666,285 B2). The use of a shield for reducing the detecting of unwanted gamma-rays and the use of a collar for protection

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purposes and to improve transmission of gamma-rays is well known to those skilled in the art.

Conclusion


11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mary Zettl whose telephone number is (571) 272-6007. The examiner can normally be reached on M-F 8am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MZ

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